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| AUTHOR | Treffinger, Donald J. |
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ABSTRACT

The paper identifies some major issues in assessing creative problem solving. Four main problems are discussed: (1) no single widely accepted theory of creativity exists; (2) there is a lack of understanding of the implications of the differences in assessment procedures; (3) researchers, on the one hand, view creativity as entirely a cognitive process or, on the other hand, entirely as a complex set of personality traits; and (4) some difficulties of assessing creative problem solving relate to the heterogeniety of the tasks that have been employed. Also listed are a number of practical problems, such as: (1) how do we know that what we consider creative tasks are creative? and (2) maybe our most unusual tasks are boring, unexciting and trivial for the most imaginative examinee. (Author/MC)

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# Problems in the Assessment of Creative Problem Solving[1]

Donald J. Treffinger
Purdue University

Our title for this symposium suggests that there has been some identifiable progress in the psychologist's understanding of creative problem solving and its assessment during the last two decades. Looking at Razik's (1965) bibliography, the Journal of Creative Behavior's attempts to update it, and at current issues of Psychological Abstracts and Dissertation Abstracts, one certainly hopes this is true, given the great amount of attention creativity and creative problem solving continue to receive. My task, however, is to be the skeptic. It is an easy task, for there are a great many problems which remain unsolved. In this brief presentation, I can merely identify some major issues.

The greatest problem, it seems, is that there is no single, widely-accepted theory of creativity which directs our efforts. Mednick's work (1962) illustrates, perhaps best of any, the formulation of a theory of creativity out of which some particular method of assessment emerges. Yet, for a number of reasons (cf., Jackson and Messick, 1965; Taft and Rossiter, 1963) this theory has not been attractive to some researchers, and can hardly be considered "widely-accepted." Guilford's structure of intellect model (1967), perhaps best called a theory of intelligence, is not a theory of creativity, despite the fact that it has been heuristically and conceptually useful in describing some cognitive abilities related to creativity. Torrance's tests (1966) purport to be broadly eclectic, drawing

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from the "best of the theory available" at the time of their publication; as such, they do not stem from a comprehensive, unified theoretical base.

From the existing array of ideas about creativity, and from the lack of "theoretical unity," it is no great surprise that there is a profusion of tests, all purporting to be measures of "creativity." Each instrument reflects the particular set of beliefs and preconceptions of its developer about the nature of creativity.

An outgrowth of this problem, and a major issue in its own right, is that we do not understand very completely the implications of differences in assessment procedures. Variations in working time, test atmosphere, and directions given to the examinee, for example, seem to yield different kinds of results, and differing patterns of intercorrelations between creativity scores and other cognitive or achievement variables. It is quite clear, from the work of Wallach and Kogan (1965) and others, that such changes occur. It is not clear why, or under what conditions certain results might be predicted. Data we have gathered at Purdue (Van Mondfrans, Feldhusen, Treffinger and Ferris, 1970) suggests that the story is much more complex than merely removing the "appearance of testing" and time limits. Removal of time limits, for example, had no significant effect on pupil performance on verbal tasks. The highest scores on these tasks were obtained under standard, "test-like" conditions. On figural tasks, however, removing time limits did influence pupil performance. Highest scores were obtained by pupils in a "Take Home" condition. We need continuing experimental work to understand the problems of test procedures and their implications more completely. Such research would also profit, if predictions could be derived from a specific theoretical conception of creativity. In the meantime, a clear implication seems to be that

researchers who utilize "creativity tests" should be extremely careful to report the procedures for test administration, directions, and timing in detail.

Another problem is that many researchers have tended, on the one hand, to view creativity as entirely a cognitive process, or, on the other hand, entirely as a complex set of personality traits. The former have tended to ignore the possibility that there may be an affective component to creativity, and the latter have tended to overlook the importance of underlying cognitive abilities in creative problem solving. A general, widely-accepted theory of creativity would, of necessity, consider both cognitive and affective factors, and would lead to a more adequate assessment procedure. In the meantime, we must be very cautious about our willingness to make inferences about "Creativity" from measures which are distinctly cognitive, particularly the divergent-thinking-type tests. This does not imply rejection of the usefulness of tests of divergent thinking. It may be that some of the critics have been too severe (e.g. Covington, 1968; Wallach, 1968). While divergent thinking measures certainly do not tell the entire story about creativity, these measures do very likely assess intellectual abilities which play an important role in creativity. Viewing creativity as a complex kind of human problem solving (which perhaps makes the term creative problem solving preferable), divergent thinking is a necessary, but not a sufficient, component.

If this is the case, one might expect certain correlational patterns among problem solving tasks which measure creative problem solving. First, we might expect that such tasks would be significantly correlated with divergent thinking measures. Secondly, since all problem solving tasks

may have in common some correlation with other abilities, such as cognition, memory, and evaluation, we would expect a given task to be correlated with measures of these abilities. Finally, we would expect that the correlation between the problem solving task and divergent thinking would not simply be a function of the relation between divergent thinking and the other common abilities. That is, we would expect that divergent thinking would be significantly correlated with the problem solving task even when other abilities, correlated with both problem solving and divergent thinking, were partialled out.

We have been working recently with multi-solution anagrams problems among elementary school children. We have found that these problems correlate moderately and positively with fluency, flexibility, originality, and IQ, which seems to represent a measure of abilities other than divergent thinking. When the effects of IQ are partialled out, the divergent thinking scores are still significantly and positively correlated with the problem solving task. In other words, in support of our expectation, the multi-solution anagrams tasks are related to divergent thinking uniquely, but are also correlated with measures of other abilities.

<u>There is also some reason to believe that some of the problems of assessing creative problem solving relate to the heterogenity of the tasks that have been employed</u>. As my colleague on this symposium, Gary Davis, pointed out (1966), the literature on problem solving is very confusing. Tasks have been used in one study and then never again. Some people have attempted, as Gary did, to categorize or classify such tasks, but this has tended to be rational rather than empirical. Some new factor analytic data

we have just analyzed, suggests that some logical groupings or judgments about tasks may not hold up very well under closer examination. Some tasks, which "on the face" seem to be attractive measures of creative problem solving reflect quite different appearances empirically.

For example, our "antelopes" problem (making words from the letters in antelopes) would seem, on the surface, to be a measure of verbal fluency. It loaded significantly, however, on a factor which also involved IQ and arithmetic computation ability, but neither of two verbal fluency measures. A problem which had no solution, and another problem with a limited and fixed number of solutions also loaded significantly on the same factor. Multi-solution anagrams tasks loaded significantly on a factor which also included several measures of verbal fluency, flexibility, and originality, as well as IQ (to a lesser extent). Two problems which had only one correct solution for each were not related significantly to the factor which included the divergent thinking measures or to the factor which included IQ and arithmetic skills.

We have a great deal to learn about the assessment of creative problem solving. It is quite clear that simple measures of fluency, flexibility, and originality are not sufficient. Perhaps we must give substantial effort to finding new, more complex measures; in this regard, the use of multi-solution anagrams tasks seems promising, at least with children. Perhaps we must begin to look more carefully at the interactions of divergent thinking scores (fluency-flexibility interactions, for example): very little use of such combined subscores seems to have been made.

Finally, we have a number of problems of a very practical nature to solve. How do we know that what we consider creative tasks are creative and challenging for the examinee? It may be that our most unusual tasks are boring, unexciting, even trivial, for the most imaginative of our examinees. Perhaps each task that purports to be an assessment of creative problem solving should be accompanied by a simple rating scale: "Have you ever worked on this problem before? Did you solve it? Were you given the solution? What did you think about the problems you have solved here? Were they interesting? Challenging? What did you think of your solutions?" Although I scrupulously avoid using the term introspection, it may be that we could learn quite a bit about our measures by asking our subjects to talk about their experiences.

Perhaps the goodness of a creative response, as Jackson and Messick have proposed, and the extent to which a problem "captures" the subject, as Covington has discussed, are important concerns, but only able to be assessed by the subject himself.

The problems are numerous, and the answers are few; even these few ideas are tentative and offered in the spirit of playful inquiry. Solving them will be, most likely, half the fun.

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